MARTI 2016 at NASA Langley Research Center, Hampton, VA

Tele-robotic Reconnaissance Extreme Environment Mission Operations (TREEMO)

A team of 10 students will collaborate to design, build and test a small autonomous Unmanned Aerial System (UAS) that will operate in tandem with a tele-robotic ground rover vehicle. The Rover is rectangular in shape and about 60-70 percent the size of a small All Terrain Vehicle (ATM). **Note: building the ATV is not part of the project, it will be provided for the team's use.**

The UAS must fly several consecutive autonomous short distance, short duration reconnaissance missions from the deck of the ATV or from the ground adjacent to the ATV. (Students will decide whether to design their UAS to launch from the ATV or the ground near it.) The data collected by the UAS must be transmitted wirelessly or by docking to a receptacle on-board the ATV. The ATV must autonomously recharge the UAS. The ATV can operate with more than one UAS, so UAS must be recharged and ready to fly every 15-30 minutes.   The UAS and ATV should be able to avoid obstacles and other UAS/ATV that may be operating in the area.

The ATV is operated tele-robotically and can be deployed to areas that are unsafe or impractical for humans to search. For example, locating injured climbers or skiers at high altitudes; avalanche victims; hazardous waste and/or nuclear power sites; poaching of wildlife; wild fires over large acreage; urban disasters; agriculture zones including crops, vineyards, orchards and animal herds; flood zones (ATV equipment could be operated from a boat); hostage, fugitive, or terrorist situations; urban disasters; earthquake zones where roads and runways have been damaged; and more.

Students will define the mission ops they choose to investigate and design their vehicles and on board systems to carry out their chosen mission. A second UAS should be configured for the mission to ensure a test vehicle is available if one goes down for repairs. (Students can purchase a small UAV and add the necessary instrumentation and computing hardware, they do not have to build one from scratch. Either scenario is available; the team will decide what option they wish to use.)

The Langley MARTI project seeks ten students (US Citizens only) who have one or more of the following skills sets and majors:
- Computer Science, Software Engineering (experienced with writing new code or adapting open source code for use with UAS/rover units; multiple types of computer language experience desired)
- Electrical Engineering, Electronics (accurately wire the on board systems of both vehicles to perform as needed; experience with UAS batteries and portable power sources)

- Mechatronics (experience with automated systems for robots and/or UAS operations)
- Mechanical Engineering (experience with and ability to design launch and docking components of the ATV/UAS units; battery management experience)
- Aeronautical/Aerospace Engineering (accurately select and/or design or modify an existing design of an appropriate type of UAS for the mission)
- Tele-robotics (experience with operation and design of mobile ground systems
- Aviation, certified RC pilot or experience as an RC Pilot (the UAS will need to have a safety pilot ready to take over should the autonomous programming fail)
- Systems Engineering (experience with complex technical systems)
- Documented experience working well with others as part of a team on a technical project
- Students with more advanced levels of experience will be among those first selected.

Applications are due no later than midnight February 16, 2016. Apply at www.martiapp.com

Questions should be emailed to Dr. Liz Ward, elizabeth.b.ward@nasa.gov